

V. Data and Research

Progress towards maximizing the effectiveness of our resources is most often achieved through research and innovation. However, for highway-rail crossing issues, institutional concerns regarding costs (research and potential implementation), liability and current convention often impede progress. The Department's involvement and leadership have the potential of promoting research and championing plausible innovation while overcoming these obstacles.

Research regarding alerting lights, retro-reflective materials, illumination and horns is currently being conducted by the John A. Volpe National Transportation Systems Center (VNTSC) in Cambridge, MA, with FRA sponsorship, to enhance conspicuity of trains at or approaching crossings for highway users, especially during hours of darkness. FHWA and some state efforts are also investigating the efficacy of innovations in highway traffic signs.

Similarly, good data is also an essential ingredient to good decision making. Research and data processing and analysis must insure that timely and accurate information needed by decision makers is available.

To address these needs the Department proposes to:

A. Host Research Round Tables/Workshops

1. Research Workshop

The goals, procedures and findings of Federal crossing related research are always of interest to the industry, state officials and academia. Government sponsored research, and the researchers involved, can also benefit from an exchange of ideas, i.e., topical workshops (not just a series of briefings), with the affected industry and interest groups. A workshop will be planned to bring together highway safety, law enforcement, rail and transit industry officials, governors' highway safety representatives, academia and consultants with Federal researchers to discuss current and projected research and needs.

2. Defense Conversion Fair

Numerous contacts have been made on behalf of defense oriented research firms seeking to bring their talents and capabilities to bear on transportation related issues. A tremendous talent pool exists. However, these firms are not familiar with transportation industry needs. A fair, complete with DOT displays and seminars, could be used to focus this potential resource on transportation, on safety and on highway-rail crossing problems. Fresh thinking and new (defense developed) technology may generate some innovative solutions to old problems. An exchange program will be planned to introduce Defense oriented research firms to railroad technology and research needs.

B. Demographics

NHTSA will develop demographic data on those who die in highway-rail crossing accidents and will assist in arranging and conducting "focus group" sessions in locales with high incident rates.

C. Accident Severity

NHTSA will investigate the increasing severity of crossing accidents and attempt to determine why the trend is increasing and what countermeasures might reverse it. NHTSA will use both their Fatal Accident Reporting System (FARS) and FRA's accident and Inventory data bases.

D. Signs, Signals, Lights and Markings

The FHWA, FTA and FRA will work together to examine the potential of providing additional information to the motorist through innovative signs, signals, lights and markings.

1. Signs and Signals

The FHWA, in coordination with FRA, will initiate conceptual studies of a number of new highway-rail crossing warning devices, such as devices to inform motorists in advance whether there is an active or passive warning system at the crossing and devices that would provide positive information about the direction from which a train is approaching the crossing.

2. Train Horns

The FRA is working with the Association of American Railroads (AAR) to study the safety impact of whistle bans nationwide. This will aid FRA in determining if nationwide Federal action is required.

The FRA is also sponsoring research by the VNTSC to develop an optimal warning signal for locomotive whistles, which minimizes noise for communities while not compromising safety. VNTSC also is investigating potential alternative systems, such as audible warning devices installed directly at crossings. (A cooperative effort involving the state of Nebraska, the City of Gering, the Union Pacific Railroad and a private firm has produced some field testing of an Automated Horn System (AHS) mounted at the crossing. The Los Angeles County Transportation Commission is also considering a similar device offered by another firm.) Some Los Angeles County commuter trains have been equipped with an innovative train whistle device, somewhat toned down and mounted lower on the locomotive in order to minimize impacts on neighboring communities, but still meeting minimum FRA standards. FRA (and VNTSC) will continue to monitor these efforts.

FRA is also exploring the potential for what amounts to a noncontractual cooperative effort among interested parties. If the Union Pacific Railroad, City of Gering, the Nebraska Department of Transportation and others with a particular interest in testing a second-generation AHS can install the device(s) at highway-rail crossings selected as test sites, and conduct neighborhood surveys, FRA, through VNTSC, will make the necessary acoustical measurements and analyses, record and analyze before and after behavior of motorists, design needed surveys, train local personnel to conduct the surveys, and analyze survey results. Work may begin this Summer.

3. Light Rail Crossing Gates for Left Turn Lanes

A large number of train/vehicle collisions take place at grade crossings where there are streets running parallel to light rail transit or railroad tracks, and motorists are permitted to make left turns across the tracks. Standard railroad crossing gates are not fully effective at crossings of this type. Where the crossings are controlled by traffic signals only, some light rail transit systems have experienced numerous train-vehicle collisions.

Calgary Transit (Canada) has installed railroad crossing gates on the left turn lanes at two grade crossings where there are heavy left turn traffic volumes. The FTA proposes to investigate the application of

railroad gates and other types of "pop up" barriers (for U.S. locations where there is not adequate space to install railroad crossing gates) for left turns made from streets running parallel to the tracks at grade crossings.

4. Locomotive Conspicuity:

On February 3, 1993, FRA issued interim standards regarding locomotive lighting to enhance conspicuity of trains. A second interim rule was published May 13, 1994. The Congressionally mandated schedule requires the FRA to initiate rule making for final regulations no later than June 30, 1994. Final regulations will be issued by June 30, 1995.

5. The Manual on Uniform Traffic Control Devices (MUTCD)

FHWA, FTA and FRA will begin work immediately to develop proposed changes and additions to the MUTCD dealing with each of the following. Proposals should be available in the third quarter of 1994, and changes to the MUTCD should be proposed during the fourth quarter.

- a. Warrants for warning devices to be used at crossings hosting high speed rail operations;
- b. New passive sign for high speed rail crossings;
- c. Standards for temporary closure of road, i.e., the signing needed to accommodate the placing of a barrier in the road;
- d. Supplementary multi-track plate for STOP and YIELD signs;
- e. Work Zone Traffic Control standards for highway projects which include highway-rail crossings;
- f. Four-quadrant gate standard;
- g. Warning device standards unique to light rail operations (The National Committee on Uniform Traffic Control Devices is currently drafting proposals regarding traffic control and light rail.); and
- h. A design standard for display of the Inventory number at each crossing.

E. Innovative Technology

FRA and FTA will cooperate to review available automated presence and intrusion detection hardware and the potential effectiveness of existing and proposed technology for conveying emergency messages.

1. Automated Video Image Analysis

Available technology will be explored regarding the potential use of live video images monitored by computers to detect intrusion onto the rail right-of-way at highway-rail crossings (or anywhere else) and to insure that warning devices are functioning properly. In theory, when intrusion or a warning device failure is detected, an alert, maybe an image, could be provided to the dispatcher and possibly to the locomotive.

2. Radar Actuation System for Light Rail Crossing Warning Devices

Warning equipment at grade crossings is typically activated by track circuits. For certain applications, these circuits need to be designed to detect train speed. These applications include innovative active warning signs or devices (such as horns mounted at the crossing or warning messages) that will be effective only if activated for a limited number of seconds in advance of when trains actually arrive at the crossing.

Where the rails are part of the traction power system (as is typical for light rail systems), speed detection equipment based on track circuit technology (referred to as crossing predictors or motion sensor) does not work in a reliable manner. A low cost alternative to determine the speed of trains is needed for light rail transit operations.

This project would investigate the limitations of existing speed detection equipment and evaluate the feasibility of a radar-based system. If the approach were determined to be feasible, a demonstration of the radar actuation system would also be undertaken as part of this project.

F. 1-800 Computer Answering System

In 1983, the Texas Legislature initiated (and pioneered) a statewide alert or early warning system designed to inform railroads of warning device/signal problems at crossings. Signs have been placed at each crossing equipped with an automated device instructing the reader:

TO REPORT MALFUNCTION OF
THIS RAILROAD SIGNAL
CALL TOLL FREE 1-800-772-7677
GIVE THIS LOCATION # _ _ _ _ _

An impediment to more widespread adoption of this "early warning" system is the perceived resource impact, i.e., Who will answer and forward telephone calls? An automated, pc-based computer system could receive, catalogue and forward telephone calls from the concerned "public" regarding problems with specific highway-rail crossing signals.

This concept is well within currently available "off the shelf" hardware capabilities. Preliminary discussions with individuals familiar with current procedures in Texas indicate this would be a welcome capability.

An automated telephone answering and message forwarding system will be developed for handling calls concerning malfunctions or problems at highway-rail crossings. The system will be founded on the U.S. DOT/AAR Inventory numbering system.

G. Light Rail Accident Statistics

FTA's Safety Management Information Statistics (SAMIS) was devised to reflect an accurate picture of transit safety. Casualty figures include pedestrians, people in other vehicles, employees, etc., as well as patrons. Incidents are collected during revenue and nonrevenue periods, so an all-inclusive view is provided. The FTA will investigate broadening current data reporting to include specific data on shared rights-of-way accidents involving light rail vehicles.

H. Resource Allocation Procedure

The computer model currently made available by FRA to states and railroads needs to be rebuilt in order to account for more recent realities, i.e., accident experience, available data and costs. The imbedded accident prediction formulas also need to be recalculated. Procurement action for this work has begun.

I. The Inventory

The U.S. DOT/AAR National Highway-Rail Crossing Inventory was developed to serve as a data base of all highway-rail crossings in the United States. The FRA is the custodian of this computer-based file. The FRA processes changes and updates voluntarily submitted by the states and railroads, more than 80,000 per year. Though the Inventory is the only national resource of its kind and is widely used, portions of it are not being updated.

FHWA will immediately initiate efforts to explore possibilities for encouraging updating of the Inventory on a more systematic or cyclic schedule. States will be encouraged to use the Safety Management System as a means of ensuring that Inventory data is updated. Additional methods of transmitting updates to FRA electronically will be explored.

FRA will hold an informal safety inquiry to consider requiring the display of the U.S. DOT/AAR Inventory number and a toll free phone number at all crossings to facilitate Emergency Notification. (See also Safety Inquiry under Private Crossings and Enforcement preceding.)